REMARKS

Favorable consideration and allowance of the present application are respectfully requested in view of the following remarks.

Claims 82-122, including independent claims 82, 99, and 113, are currently pending in the present application. Independent claim 82, for instance, is directed to a method for forming a paper web that contains a first layer formed primarily from hardwood fibers. The method comprises treating the hardwood fibers with a first hydrolytic enzyme to hydrolyze the fibers and form aldehyde groups predominantly on the surface thereof, wherein the dosage of the hydrolytic enzyme is from about 0.1 to about 10 s.e.u. (standard enzyme units) per gram of oven-dried pulp. The first hydrolytic enzyme comprises a cellulose-binding domain free endo-glucanase. In addition, the method comprises treating the hardwood fibers with a cross-linking agent that forms a bond with the aldehyde groups on the surface of the hardwood fibers.

In the May 15, 2003 Final Office Action, independent claims 82, 99, and 113 were rejected under 35 U.S.C. §103(a) as being obvious over WO 98/56981 to Seger, et al. Seger, et al. is directed to modified cellulosic fibers having a reduced dry zero span tensile index. To obtain the modified cellulosic fibers, a cellulase-containing enzyme is added to an aqueous slurry of fibers. (Page 13). The enzyme modifies the morphology of the fibers. (Page 13). After mixing of the fibers and enzyme preparation, the mixture is preferably, though not necessarily, combined with a debonder or chemical softener to preserve the fiber morphology modifications that result from enzymatic action. (Page 13). Specifically, Seger, et al. indicates that the addition of a debonder to wet enzyme-modified fibers prevents the "repair" of the fibers that would otherwise take place upon drying. (Page 17).

As indicated in Applicants' previous response, it is believed that the enzymes of Seger, et al. (e.g., Celluclast®, Celluzyme®, Pergolase®, and Carezyme®) have a cellulosic-binding domain that attaches to the fiber surface and hydrolyzes the cell wall. This weakens the fibers, thereby making them more flexible and providing a reduced dry zero span tensile strength.

The May 15, 2003 Final Office Action raised several points with respect to this issue. First, it was stated that the enzymes of Seger, et al. function in the same manner as the enzymes set forth in independent claims 82, 99, and 113 "since it produces the same effect, i.e., increased tensile strength." In a Response filed June 25, 2003, Applicants made numerous arguments that the enzymes of Seger, et al. *do not* function in the same manner as the cellulose-binding domain free endo-glucanase enzymes of the present claims. For instance, according to Seger, et al., there is at least about a 15% reduction, more particularly, a 35% reduction, in the "dry zero span tensile index" after being treated with an enzyme. (See, e.g., page 3). Specifically, tensile strength is said to be controlled by two primary factors, i.e., "fiber zero span tensile strength" and "fiber-fiber bonding." With tissue and towel products, the "fiber zero span tensile strengths" are generally at least 10 times greater than the overall tensile strength of the sheet, which indicates that "fiber zero span tensile strength" can be reduced without adversely affecting overall product strength. (Page 2). Thus, the purpose of Seger, et al. is to reduce "zero span tensile strength" without reducing fiber-fiber bonding as a technique for providing a product with enhanced softness without negatively impacting strength to a significant degree. (Page 3).

This is in direct contradiction to independent claims 82, 99, and 113. In the present claims, the combination of a cellulose-binding domain free endo-glucanase with a cross-linking agent acts to increase overall tensile strength. Specifically, the enzyme hydrolyzes the fiber predominantly at or near the surface, thereby avoiding or minimizing the degradation of cell walls found with other types of enzymes. (Appl., page 8). Moreover, a cross-linking agent may form a bond with groups formed predominantly on the surface of the enzyme-treated fibers and act as a "bridge" between the groups and two or more enzyme-treated fibers. (Appl., pages 12-13). Thus, contrary to the strength reduction and fiber degradation achieved by Seger, et al., the methods of independent claims 82, 99, and 113 cause in an increase in fiber tensile strength.

In the May 15, 2003 Office Action, it was also stated that it would have been obvious to employ Applicants' claimed cellulose-binding domain free endo-glucanase

enzyme because it is a commercially available form of endo-glucanase. Applicants noted, however, that Seger, et al. teaches away from employing enzymes that do not substantially "damage" fiber morphology. Seger, et al. requires fiber degradation to achieve the reduction in zero span tensile strength desired. For instance, Seger, et al. indicates that the enzyme modifies the morphology of the fibers. (Page 13). Further, Seger, et al. also states the following:

> While not wishing to be bound by theory, it is believed that the debonding agent maintains the fiber "damage" caused by the enzymatic attack on the fiber. That is, after the enzyme alters the morphology of the fiber, the debonding agent prevents the "repair" of the fiber, at least to some degree, that otherwise may take place upon drying.

(Pages 16-17) (emphasis added). Similarly, Seger, et al. describes two of its enzymes, Celluclast® and Carezyme®, as being preferred because of their ability to degrade carboxy methyl cellulose or amorphous cellulose. (Pages 11-12). From the above, it is clear that the enzymes of Seger, et al. must damage the fibers to achieve the desired results.

Again, to the contrary, independent claims 82, 99, and 113 utilize an enzyme that specifically minimizes fiber degradation, and instead attacks predominantly the surface of the fiber. (Appl., pages 11-12). Consequently, cross-linking agents may act as a "bridge" between these modified fibers to increase the overall tensile strength of the product.

Responding to Applicants' arguments in the June 25, 2003 Response, an Advisory Action mailed on July 11, 2003 for the present application referred to the above-quoted passage from Seger, et al. and stated: "There is no factual evidence which shows that the present invention is patentably different from Seger, et al.'s." In response, Applicants include herewith a Declaration Under 37 C.F.R. § 1.132 of Werner F.W. Lonsky and Alberto R. Negri, two co-inventors of the presently claimed invention. The Declaration provides factual evidence comparing the presently claimed cellulose-binding domain free endo-glucanase enzyme to an endo-glucanase enzyme used by Seger, et al. The submission of this Declaration was discussed during a telephone interview between Attorney for Applicants and Examiner Chin held on October 7, 2003.

The experimental results described in the Rule 132 Declaration show that a cellulose-binding domain free endo-glucanase enzyme reacts differently with hardwood fibers when compared to the reaction of the endo-glucanase enzymes used by Seger, et al. (such as Carezyme®) with hardwood fibers under the same conditions. Specifically, in Seger, et al., treating cellulosic fibers (i.e., hardwood fibers) with certain endo-glucanase enzymes (i.e., Carezyme®) results in the treated fibers having significantly reduced dry zero span tensile strength (when compared to untreated fibers). (See Seger, et al., pages 3-5 and Examples 1-10). Yet, the experimental results described in the enclosed Declaration reveal that hardwood fibers treated with the presently claimed cellulose-binding domain free endo-glucanase *do not* experience a significant reduction in dry zero span tensile strength. (See Declaration, Table 1 and Paragraphs 16-19).

Additionally, in Seger, et al., treating cellulosic fibers (i.e., hardwood fibers) with certain endo-glucanase enzymes (i.e., Carezyme®) results in the treated fibers having essentially the same or slightly decreased tensile strength (when compared to untreated fibers). (See Seger, et al., page 7 and Examples 1-10). Yet, the experimental results described in the enclosed Declaration reveal that hardwood fibers treated with the presently claimed cellulose-binding domain free endo-glucanase experience a significant *increase* in tensile index. (See Declaration, Table 1 and Paragraphs 16-19).

Applicants respectfully submit that the experimental results described in the Rule 132 Declaration provide sufficient factual evidence that the presently claimed cellulose-binding domain free endo-glucanase enzyme reacts differently with hardwood fibers than the endo-glucanase enzymes disclosed by Seger, et al. For instance, the treatment of hardwood fibers with the presently claimed cellulose-binding domain free endo-glucanase enzyme does not result in at least a 15% reduction in dry zero tensile span, which is required by the enzyme treatment of Seger, et al. Applicants further submit that in view of this evidence, it would not have been obvious to employ Applicants' claimed cellulose-binding domain free endo-glucanase enzyme in Seger, et al.'s fiber-modification processes because, for instance, the presently claimed cellulose-binding domain free endo-glucanase would not have provided the amount of fiber

degradation, measured in dry zero span tensile reduction, *required* by every embodiment of Seger, et al.

Generally, then, Applicants respectfully submit that independent claims 82, 99, and 113 patentably define over Seger, et al. Seger, et al. fails to render obvious the methods of independent claims 82, 99, and 113, wherein the combination of providing a specific web construction, that includes a layer formed primarily from hardwood fibers treated with (1) a specific dosage of a hydrolytic enzyme comprising a cellulose-binding domain free endo-glucanase, and (2) a cross-linking agent, provides a synergistic paper web that is soft, strong, and has low levels of lint and slough.

In addition, the above-cited reference was cited to reject dependent claims 83-98, 100-112, and 114-122. Applicants respectfully submit, however, that at least for the reasons indicated above relating to corresponding independent claims 82, 99, and 113, claims 83-98, 100-112, and 114-122 patentably define over the reference cited. However, Applicants also note that the patentability of dependent claims 83-98, 100-112, and 114-122 does not necessarily hinge on the patentability of independent claims 82, 99, and 113. In particular, it is believed that some or all of these claims may possess features that are independently patentable, regardless of the patentability of claims 82, 99, and 113.

In summary, it is respectfully submitted that the claims are patentably distinct over the prior art of record. Thus, it is submitted that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested. Examiner Chin is invited and encouraged to telephone the undersigned at his convenience should any issues remain after consideration of the present Response.

Please charge any additional fees required by this Response to Deposit Account No. 04-1403.

Respectfully submitted,

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